Long Noncoding RNAs in Cell-Fate Programming and Reprogramming.

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Public Summary:
This review highlights recent studies of a new class of genes called long noncoding RNAs (lncRNAs) in stem cell biology. Specific lncRNAs have emerged as important control mechanisms for stem cells in the brain, heart, skin, and other adult tissues. Embryonic stem cells also use many lncRNAs to control their behavior. One such key events in embryonic stem cell biology is the role of lncRNAs in equalizing the gene expression levels between male and female cells.

Scientific Abstract:
In recent years, long noncoding RNAs (lncRNAs) have emerged as an important class of regulators of gene expression. lncRNAs exhibit several distinctive features that confer unique regulatory functions, including exquisite cell- and tissue-specific expression and the capacity to transduce higher-order spatial information. Here we review evidence showing that lncRNAs exert critical functions in adult tissue stem cells, including skin, brain, and muscle, as well as in developmental patterning and pluripotency. We highlight new approaches for ascribing lncRNA functions and discuss mammalian dosage compensation as a classic example of an lncRNA network coupled to stem cell differentiation.